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SCIENTIFIC NEWS

MECHANICS' AND INVENTORS' JOURNAL.

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Automatic Gas-light Extinguisher.

WE present to our readers in the accompanying illustrations an important improvement in gas-light extinguishers, recently patented by William H. Hovey, of Springfield, Mass.

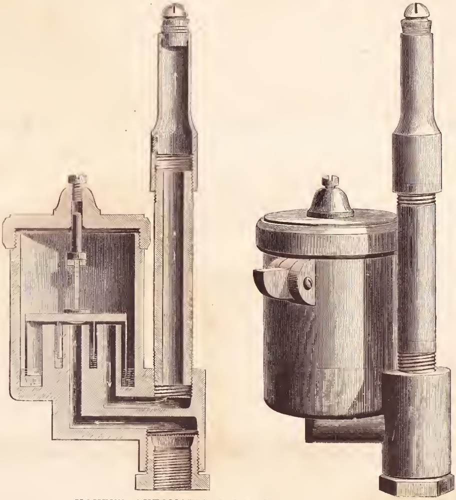
In this device, gravity alone is employed to automatically extinguish the gas-light; and there being no mechanical movements employed, the device is entirely certain and positive in its action, while it is thoroughly durable.

Fig. 1 is a side elevation and Fig. 2 a sectional view of the extinguisher, which consists of a barrel or cylinder having in its bottom two annular recesses containing mercury, and receiving the two rings of a double cup inverted so that the rings of the cup enter the mercury. The outer ring, however, is the longest, and is arranged to never leave the mercury; hence it, at all times, seals the gas within the outer cup.

The gas from the main enters the inner cup through a hole in the centre of the bottom of the cylinder, and the weight of the cup counteracting the pressure of the gas, acting upon the small area of the inner cup (the ring of the latter being immersed in mercury), seals the gas within the inner cup. By means of the lever shown in Fig. 1, however, the inverted cup can be lifted to the amount allowed between the end of the vertical spindle (which guides the cup) and the set-screw shown above it; and this movement causes the inner ring to leave the mercury, and the gas flows around the inner ring and into the outer ring of the cup; thence it passes through a hole provided for the purpose to the gas burner, its passage being denoted in the cut by the arrows.

It will be observed that so soon as the cup is lifted the gas is turned on and the gas pressure acts upon the area within the large ring, where it will remain until the gas pressure is so reduced that the weight of the cup overcomes it, when the cup falls, and the gas is extinguished. The point at which this action occurs is regulated by a very simple means of loading the cup. But so soon as the cup has fallen, the gas pressure acting on the small area of the inner cup only is insufficient to lift it until assisted by the lever before referred to.

By loading all the cups in a street or district alike, or according to the elevations, all the lights in that street or district would extinguish themselves simultaneously so soon as the gas pressure was reduced to the required point. Or if so adjusted, different lights would extinguish themselves at different times; but the reduction of the pressure upon the street lights does not affect the steady supply of gas in dwellings. The manufacture and sale of this novel and useful improvement is in the hands of Messrs. Fairbanks & Co., the well-known scale manufacturers, 311 Broadway, New York, to whom all communications should be addressed.



HOVEY'S AUTOMATIC GAS-LIGHT EXTINGUISHER.

KOUMISS is the name given to a new beverage which is having a considerable sale. It is produced from milk by a process of fermentation which induces the formation of alcohol and carbonic acid, the latter in such quantities as to aërate the fluid, and thus produce a sparkling beverage. It is said that consumption cannot resist it; be that as it may, such a beverage must supply a very great want to those who find it difficult to take sufficient nourishment in a solid form. It is, moreover, a refreshing form of aërated drink for hot weather, being much more wholesome than ginger-beer and inferior lemonades; all kinds of flavors can be obtained to suit the palate, so that the most fastidious may be readily pleased.

THE notion that ice purifies itself by the process of freezing is not based upon trustworthy observation. On the contrary, it is utterly wrong in principle to take ice for consumption from any pond the water of which is so foul as to be unfit for drinking purposes.

"SAVARY'S mordant" is a mixture of alum, tartar, extract of indigo, and bichromate of potash in the form of a paste. Upon wool it dyes a blue-black with logwood, a green with young fustic, and a reddish brown with sanders, or calliatura.

FOR covering the necks of bottles containing volatile liquids, gutta-percha, dissolved in benzol, is recommended. It is impervious to air, moisture, alcohol, and acids, and is easily removed when requisite.

STAINS of pyrogallic acid are removed from linen by a solution of oxalic acid in weak alcohol (50 to 60 per cent), and subsequent exposure to direct sunlight.

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Salem H. Wales. Edward H. Wales.

This number of the Scientific News will doubtless fall into the hands of many who have not before received it. We shall begin the second volume on the 1st of January next.

WE MAKE THIS PROPOSITION:

Whoever will remit one dollar will receive the paper regularly from this time till the end of next year. In other words, such subscribers will receive the November and December numbers free. Please send in your subscription without delay, and we promise to give you your money's worth.

We are now approaching the completion of the first volume of the Scientific News, and it would be ungrateful did we not acknowledge the kind and friendly support which has been accorded to our somewhat unpretentious sheet. We started this journal for the purpose of giving scientific intelligence in an acceptable and popular way, at a moderate cost; and as we are once more fairly in the editorial harness, we purpose, with your encouragement, to permanently improve the paper, so that while giving additional scope to current scientific intelligence, we can make its columns of more value to inventors and practical mechanics. We hope to present our plan of the coming campaign with our next issue.

The office of the Scientific News is at No. 10 Spruce Street, up one stairs, and opposite the side of the Tribune Building—one of the most conspicuous objects on the American continent. From our front windows we get a sort of angular view of this structure, which may justly be regarded as one of the minor wonders of the world.

Thomas A. Edison, the famous inventor, has perfected an improvement in the electric light which has very much frightened the gas companies of London. It comes by special cable that no less a sum than $130,000,000 is invested in the manufacture of gas in Great Britain, and it is feared that Edison's discoveries may ruin this vast interest. So much for being a first-class genius!

It is said that Cyrus H. McCormick, of reaper fame, is willing to take a seat in the United States Senate from the State of Illinois. Mr. McCormick has great wealth and an honorable ambition.

Walter Abbott Wood, of Hoosick Falls, N. Y., inventor and manufacturer of Wood's reaper and mower, is a candidate for Congress for the Rensselaer district; and his opponent is his brother, William Anson Wood, a rival and competitor in the same business as well as in the field of politics.

Commissioner Spear Aroused.

Commissioner Spear in a recent order, in which he disbarred from practice before the Patent Office a patent attorney "because of gross misconduct," takes occasion to utter some very wholesome truths in regard to the manner in which applications are prepared. He says: "A large percentage of the cases filed in the office are prepared by men who have none of the requisites, and little knowledge beyond mere forms. These are often subordinates dismissed from the office or from private firms for incompetency or fault, or draughtsmen or model-makers."

The specifications filed by these attorneys are frequently so imperfect and obscure as to be unfit for publication, and are a fraud on inventors. The examiners of the Patent Office, he says, cannot undertake to do the work of attorneys by rewriting and correcting their specifications. Inventors are, therefore, urgently advised by the commissioner to avoid illiterate attorneys who advertise to work at the cheapest rates, but whose services are dear at any price.

Commissioner Spear, in his righteous zeal to protect honest and unsuspecting inventors against the practices of ignorant patent shysters, urges that the attorney should possess experience and technical and legal knowledge, based on a *liberal* education. Precisely what the commissioner means by the term "liberal education," he does not tell us; but it is commonly used to designate one who has acquired a college or classical education. Surely Commissioner Spear does not mean to say that in order to practise well before the Patent Office a man must "go through college."

From among the most successful patent attorneys within our knowledge past and present we could mention several who became eminent, and that, too, without the advantage of a college education. We also venture to assert that if the commissioner, who enjoys the reputation of being a learned man, will prosecute his researches into the philological standing of this class of attorneys he will discover among them quite a number of men who can prepare and argue cases before the Patent Office with ability and power, but who have not been through college.

As a general rule, a liberal education is valuable to any man; but in our day we have occasionally met with learned fools.

Elevated versus Underground Railways.

Our readers will recollect that years ago a system of underground railways for the passenger traffic of New York City was strongly advocated. Whatever opinion may be held by prejudiced or candid minds upon the feasibility of the routes then proposed, the method of the road, or the method of propelling cars then advocated, it will scarcely be denied that the general merits and advantages of elevated railways and underground railways are almost wholly unconnected with such considerations. Since the time referred to, both systems have been put on trial, and a comparison of their advantages and disadvantages can now fairly be made. To such a comparison this article will be directed. We shall, however, principally consider the subject with relation to the public interest rather than with reference to the interests of the corporations which have built and operated the roads in question.

For some reason it has been found necessary to construct the elevated roads at such a height above the surface that the stations can only be reached by climbing through a distance much greater than is demanded for the ascent from underground railways. A comparison upon this point may easily be made by any one who has travelled on the underground railway between the Grand Central Depot at Forty-second Street, New York, and Harlem, and who also has wound his weary way up the tedious ascent to the stations of either of the three elevated roads now in operation.

Another serious discomfort to passengers not met with upon the underground roads is the biting wind and the storm through which under some circumstances all passengers are compelled to pass on their way from the passenger rooms to the cars. The companies have done all they could, or will do all they can, to lessen this evil; but they cannot wholly obviate it. Their elevated platforms will be swept by winds and rain whenever the wind blows in a direction parallel to the line of their roads, in spite of all they can do. Underground stations are not attended with this inconvenience, and passengers can pass to and from cars at such stations without the use of umbrellas, which can scarcely be used under such circumstances.

It has become quite certain, from the experience of property-holders along the elevated lines, that a great depreciation of value must be expected in all or nearly all property lying along the streets traversed by the elevated roads.

In this most important particular the observer whose property does not lie adjacent to the elevated roads may satisfy himself by examining the difference in the class of business and the kind of tenants which occupy the buildings along the oldest of the elevated lines, noting the large proportion of buildings that are entirely unoccupied, and comparing the same with the condition of the property before the opening of the road; after having done this, let him make a tour along the line of the underground road above the Forty-second Street depot, and look at the property there. The contrast will be simply amazing to any one who has known the past value and condition of the property in the two sections of the city, and has not made the investigation we suggest. There has always been a great difference in the character of property in the two sections named, but it is hardly to be credited how much the disparity has been widened and increased. The effect upon property along the lines of the new roads must inevitably be the same as it has been along the West Side elevated road, which has been in operation for a number of years. This effect will begin to be felt more and more as leases for dwellings and stores expire. Ultimately, the property must be surrendered to manufacturing purposes, and it will only be well adapted to the rougher trades. Unless some method of remedying the effects of smoke and coal dust be speedily found, all manufactures which require cleanliness for their successful conduct will shun the lines.

Much has been said about the noise, but the dirt and smoke are the worst evils. In the summer, when occupants are compelled to have their windows open, the winds carry the black dust and sulphurous fumes into apartments, and soil and tarnish every thing, in spite of all practicable defences which can be instituted.

For these reasons, although regarding the roads as a great public benefit, we are still of opinion that underground roads would supply the public need for rapid transit with far less inconvenience, and, when the sacrifice of adjacent property is taken into consideration, at less cost than the elevated roads.

A Patent Decision that Grew Out of the Fire.

The destruction by fire of a large number of models is likely to cause considerable trouble in the examination and final disposition of applications for the reissue of defective patents. It must be understood that in such cases the almost invariable rule of practice has been, not to allow a claim upon a reissue for any thing not shown in the original model. A recent case has been decided by Assistant Commissioner Doolittle, which will be of interest to many patentees.

F. A. Williams applied for the reissue of a patent granted to him for improvements in elevated railways—a subject of considerable interest just now. The model was destroyed in the great fire, and the patentee offered extraneous proof to show what this model contained. The examiner to whom the case was referred refused the application. An appeal was taken to the commissioner, who decided that there was no evidence whatever that either the specification, drawing, or model, as originally filed, showed bolt-holes in the bed-plate. On the contrary, the examiner shows, in his answers to this appeal, that the existence of such a feature was not consistent with his suggestions and criticisms made before the destruction of the model by fire.

To permit proof extraneous from the office records, on which to base a reissue of a patent, is entirely inadmissible under the statute at all times, and the office does not feel authorized, without special act of Congress, to receive such proof as to the contents of lost or destroyed records in absence of any official copies of the same.

In suits at law secondary proof of the contents of an instrument is admissible where the original has been destroyed or lost; but for this office the character of proof as to reissue applications is specifically prescribed by statute. The only exception made is by the latter part of section 4916, Rev. Stats., which allows the commissioner to receive proof satisfactory to himself that certain new matter was part of the original invention; but this is in cases where neither model nor drawing was filed with the original specification.

We hope none of our readers will omit the perusal of Professor Fairfield's lecture on "Life Atoms," reported in this issue of the Scientific News. The subject so well discussed has a personal interest to us all.

Electricity vs. Gas.

EDISON'S ELECTRIC LIGHT is just now creating a good deal of stir. Gas-manufacturers are excited about it, and gas-consumers are delighted with the possible success of a new, more brilliant, and less expensive light. Such a thing is more than probable. Many of us remember the days of tallow-dips and whale-oil. The whalers of New Bedford and Nantucket well remember these, to them, good old days; but, alas! their occupation has departed. In the progress of science, oil made from lard and other oleaginous substances came along, and finally the discovery of petroleum put an end to the whale-oil business. We do not know, of course, what science may be able to achieve in the line of giving us a cheap and effective light, for as yet we do not know what Edison has discovered, but we do say that no published discovery in the electric light need cause any anxiety to gas-producers, so far as it may be applicable to general uses.

Edison is undoubtedly a great genius, and has got the confidence of capitalists, who have organized under the general corporation law of this State "to produce light, heat, and power by electricity."

Edison went to Ansonia, Ct., with Professor Chandler and Professor Barker to examine Wallace's apparatus, which has attracted a good deal of notice at the American Institute Fair.

"I saw," as he says to a reporter of *The Sun*, "for the first time every thing in practical operation. It was all before me. I saw the thing had not gone so far but that I had a chance. I saw that what had been done had never been made practically useful. The intense light had not been subdivided so that it could be brought into private houses. In all electric lights heretofore obtained the intensity of the light was great, and the quantity very low. I came back home and made continuous experiments two nights in succession. I discovered the necessary secret, so simple that a bootblack might understand it. It suddenly came to me, the same as the secret of the speaking phonograph. It was real, and no phantom. I was as sure that it would work as I was that the phonograph would work. I made my first machine. It was a success. Since then I have made nearly a dozen machines, each different, and the last ones improvements upon those first made. The subdivision of the light is all right. The only thing to be accurately determined is its economy. I am already positive that it will be cheaper than gas, but have not yet determined how much cheaper. To determine its economy, I am now putting up a brick building back of my laboratory here. It is to be 125 feet long. I have already ordered two eighty-horse-power engines for this building I consider them the best engines in the country.

"We use no batteries. It isn't necessary. We simply turn the power of steam into electricity, and the greater steam-power we obtain the more electricity we get. One object in putting up this brick building is to ascertain how many electrical jets, each equal to one gas jet, can be obtained from a one-horse-power.

"I've already told you," continued Mr. Edison, "that electric lights have had marked intensity and a low quantity. I'm turning it the other way—reducing the intensity and increasing the quantity of light, as far as possible. It requires a good deal of experimenting to ascertain how far this can be done. You alter the nature of the electric light when it is done. I have already done it to a certain extent, and don't think that it was ever before attempted on the line on which I'm at work."

Mr. Edison said that they proposed to light the city, public buildings, and private residences with electric lights. The electricity would be made by twenty or more engines, stationed in different parts of the city. Instead of manufacturing all the electricity at one central point, as gas companies make gas, there would be twenty stations. Each station would have an engine and several electric generating agencies. "You know," said the professor, "that when electricity goes out it must always get back to where it went from. Therefore each station will have one grand return wire, with which separate wires will connect, thus forming the necessary electric circuit. I think that the engines will be powerful enough to furnish light to all houses within a circle of half a mile. We could lay the wires right through the gas-pipes, and bring them into the houses. All that will be necessary will be to remove the gas burners and substitute electric burners. The light can be regulated by a screw the same as gas. You may have a bright light or not, as you wish. You can turn it down or up, just as you please, and can shut it off at any time. No match is needed to light it. You turn the cock, the electric connection is made, the plantinum burner catches a proper degree of heat, and there is your light. There is neither blaze nor flame. There is no singing nor flickering. I don't pretend that it will give a much better light than gas, but it will be whiter and steadier than any known light. I do know now that it will be cheaper than gas. It will give no fumes nor smoke. No carbonic-acid gas will be thrown off by combustion. It will be a great thing for compositors, engravers, and all forced to work during hot summer nights, for it will throw out hardly any heat. Shades may be used the same as shades upon gas-lights, but there will be no real necessity for them. The wind can't blow it out. There can be no gas explosions, and no one will be suffocated because the electricity is turned on, for it cannot be turned on without lighting the burner. A person may have lamps made with flexible cords, and carry them from one point to another."

"I have made no attempt to discover a meter. I know that it can be measured, but it may take some time to find out how. I propose that a man pay so much for so many burners, whether he uses them or not. If I find that this works an injustice, why I shall try to get up a meter, but I fear it will be very hard to do it."

Mr. Edison says that electric generating machines could be placed upon steamboats and locomotives, and the boats and cars lighted by the action of the engines, but the instant that the machinery stopped the lights would go out.

The professor exhibited an electrical generating machine. It is what is known as a Wallace machine. A knot of magnets run around the cylinder facing each other. Wires were attached to it. Edison slipped a belt over the machine, and the engine used in his manufactory began to turn the cylinder. He touched the point of the wire on a small piece of metal near the window casing, and there was a flash of blinding white light. It was repeated at each touch. "There is your steam-power turned into an electric light," he said.

"But how do you utilize the light?" was the next inquiry.

"Open your mouth," the professor replied, with a pleasant twinkle in his eye. "I want to look at it."

The chaffing was too evident, and the mouth remained closed. Curiosity, however, led to the question as to what a man's mouth had to do with the utilizing of the light. "I only wanted to see," said the professor, "whether there was room enough in a reporter's cheek for nine rows of teeth."

It was a fair hit, but the rough edge was smoothed off by an exhibition of the light. It was a simple secret, but not one ready for publication. There was the light, clear, cold, and beautiful. The intense brightness was gone. There was nothing irritating to the eye. The mechanism was so simple and perfect that it explained itself. The strip of platinum that acted as burner did not burn. It was incandescent. It threw off a light pure and white. It was set in a gallows-like frame, but it glowed with the phosphorescent effulgence of the star Altaire. You could trace the veins in your hands and the spots and lines upon your finger-nails by its brightness. All the surplus electricity had been turned off, and the platinum shone with a mellow radiance through the small glass globe that surrounded it. A turn of the screw, and its brightness became dazzling, or was reduced to the faintest glimmer of a glow-worm. It seemed perfect. The professor gazed at it with pride.

The Yellow-Fever Poison.

THERE can be little doubt that the cause of yellow-fever is a blood poison. The active symptoms of the disease, the post-mortem appearances of the bodies of those who die of the complaint, the large proportion of those attacked by it who do not recover, the rapid march of the disease to a fatal or favorable crisis, point clearly to an active poison which, gaining access to the blood, excites therein a species of fermentation which results in the decomposition of the vital fluid.

Numerous peculiarities attending the propagation and spread of this plague also indicate that the poison is either of lower specific gravity than air, or else that when floating loosely in the air it does not travel far without losing its force and malignity. The very slow progression of the disease from any locality, unless the poison be transported in clothing or merchandise, proves this, for if the poison, whatever it may be, were of the same or nearly the same specific weight as that of air, and capable of retaining its power when freely exposed to air for any considerable period, it is evident that it would be carried along by winds, and that its progress would be rapid.

This conclusion, taken in connection with another singular but seemingly well-established fact, is of great significance as pointing to something in ordinary out-door atmospheric air which acts as an antidote to yellow-fever malaria. It is authoritatively asserted that people accustomed to the disagreeable odors of tanneries, soap-boiling establishments, and the like, are almost wholly exempt from the disease. It thus appears that some exhalations from organic matters, either putrid or otherwise, produce upon the human system either a prophylactic or antidotal influence which renders the yellow-fever poison either inert or neutralizes its effects. This fact is further remarkable in that it contradicts the popular opinion that all decaying organic matters upon the surface of the streets of towns or on plantations are favorable to the spread of yellow-fever malaria. As we have seen, some such matters do not favor the disease, but are inimical to it.

The cause of yellow-fever does not originate from such sources, however much they are to be deprecated on other accounts. The poison is specific, and there is strong ground to believe that its antidote can be found in some of the strong odors or exhalations if an earnest, well-directed, scientific search be made for it.

A Rare Specimen of Tourmaline.

READERS of Saxe Holm's stories may be interested to know that Professor Oren Root, of Hamilton College, Clinton, N. Y., has a large collection of tourmalines, and among them one of magnificent size and beauty, that is believed to be the largest ever quarried on this planet. Alice Fisher's marvellous tourmaline was two inches long. Professor Root's largest specimen is six inches long, very massive, and beautifully bevelled. Its terminal faces are unbroken. One end shows positive electricity, the other negative. It was found in St. Lawrence County, near Rossie, where Professor Root has been a diligent and successful explorer. The samples of tourmaline found near Rossie are much larger and more perfect than those found in Maine or any European locality.

Phosphorescent Clock and Watch Dials.

MR. FRITZ RÜSSER, of Geneva (Switzerland), has invented phosphorescent clock and watch dials which, being exposed to sunlight during the day, permit the reading of the hour plainly during the following night. Some of these dials have been presented by Mr. Boden-Henner to the Swiss Society of Natural Sciences at Berne.

The manufacture of these dials is already in progress at Chaux de-Fonds, and they are on sale in this city. The condition of horology is described as improving in Switzerland.

PURE AIR.—Pure air is an essential of pure blood. Pure blood makes stout nerves; consequently pure air which makes the good blood is an essential of the nervous system. Good nerves insure good digestion, therefore pure air, which through the blood makes the nerves good, is an essential of the digestive functions. Good digestion makes good blood, which brings us to our starting-point, and proves that pure air is the first element in animal existence. From the cradle to the grave we breathe every moment, during working and sleeping hours. Pure living air therefore we require every instant. Bad air is a blood-poisoner. Air once passed through the lungs is poisonous. It is not only deprived of its living and life-giving constituents, but it is loaded with impurities, especially when expired by unhealthy subjects. Fever malaria comes always from poisoned air. There may be no worse poison than the poison emanating from the skins and lungs of a mass of human beings. If therefore you would escape "blood-poisoning," have constant free ventilation.

(*Special Correspondence of the Scientific News.*)

New and Curious Inventions at the Paris Exposition.—No. 4.

A NEW TYPE-WRITER—THE SPHEROGRAPH.

A NEW type-writing machine is exhibited in the Danish section, which I think is the simplest which has yet been contrived, and which seemingly does better work than the much larger and better known American apparatus. It is an essential requirement of all machines of this class that the types shall be so adjusted that the imprint of each character is made at precisely the same spot This of course involves the arrangement in a circle of the arms on the ends of which the types are affixed, of which circle the arms are radii. It is hardly possible that any type-writer will be contrived not embodying this construction, and it therefore may perhaps be predicated that further improvements in this apparatus will be in the direction of simplifying the mechanism between the keys, which are pressed by the fingers, and the device which directly effects the imprint. This at least may be regarded as the aim of the inventor of the new Danish machine. He begins by abolishing the usual keyboard altogether, and in lieu thereof he places a semicircular cap of copper over the circle of type arms, and connects each arm with a single spring push button by a rod which passes through the cap. The types are placed on the ends of the arms face downward, so that they strike upon the band of blackened ribbon which passes beneath them, and thus make their imprint upon the paper, which is previously placed upon a curved sheet of metal, below the ribbon. This curved holder has two motions: one of gradual rotation on the axis of the cylinder, of which it would form a section; the other a longitudinal movement. The first is produced by the downward motion of the entire cap, each stroke of the operator upon a button not merely causing a character to be imprinted, but likewise bearing down the cap which, by suitable gearing, causes the rotation of the cylindrical segment over a sufficient space to provide for the proper placing in succession of the next character in the word. When a line is finished, pressure on a button at the side of the machine determines the longitudinal movement of the paper over a suitable distance.

The mechanism is exceedingly simple and compact, and the entire machine occupies a space on the table of less than the area of a page of this journal. A practised operator can write with it about three times as fast as a good penman can produce script, or about 80 words per minute. Mr. Walling Hansen, of Copenhagen, is the inventor.

FILE-CUTTING BY MACHINERY.

All the mechanical experts at the Exposition have been greatly interested in the new Mondon file-cutting machine, which seemingly produces very excellent files entirely by automatic machinery, and in a very rapid manner. File-cutting machines have been a stumblingblock for many an adventurous inventor, and the simple fact that none are now in general and successful use perhaps is sufficient proof of the fact that no machine of the kind meeting all the requirements has been invented. The difficulty is to imitate by mechanism the yielding blow delivered by the workman's hammer. A rigid pound does not answer. It is true that by ingenious combinations of springs the elastic stroke of the file-cutter may be in a measure imitated, but machinery cannot supply judgment, and upon this, on the part of the workmen, especially when the metal operated upon is not of uniform density, the success of the file manufacture in no small measure depends. Still in the Mondon machine an exceedingly close approximation to the hand stroke has been reached. Whether this be sufficiently close to adapt the apparatus to extensive use in the industrial production of files in large numbers, I shall not venture an opinion, in the absence of a more extended record than the machine has as yet made for itself.

The features in M. Mondon's apparatus are briefly, first, a cam shaft, the cams on which raise the weighted hammers, and the latter falling act upon the file. There is an ingenious arrangement of springs in connection with the hammers which renders the blow elastic. In one system the cutting chisel is supported in a spring holder, and struck by the hammer; in another, the chisel is attached directly to the hammer itself. The latter arrangement, as the more elastic, seems to me to be preferable. I notice, however, that the inventor places most stress upon the feeding apparatus as the essential feature of the machine. A lever in connection with the hammer cam shaft transmits motion to gearing which in turn operates the screw, which causes the traversing of the carriage to which the file is attached. By this gearing the file is first moved forward, and then arrested during the time of the blow, and to cause the hammer to fall at exactly the proper time the cams on the shaft above referred to are especially adjusted. The foregoing is the gist of the mechanism, and though scanty in detail it is perhaps sufficient to indicate the general nature of the invention. There are ingenious devices for causing the automatic adjustment of the file-carriers to any inequalities in the files, so that they are always in contact with the anvil, whatever their thickness may be. Another important point is that the chisels may be set so as to cut the files at any desired angle—that is to say, more or less under cut as desired. I saw the machine put two cuts over a 14-inch file in six minutes. The inventor claims that three machines (four hammers each), four men, and a motive-power of 2 horse can do the work of 48 good file-cutters at a very large profit.

AN INGENIOUS LIQUID MEASURE.

Here is a little contrivance for measuring liquids which seems to me exceptionally in-

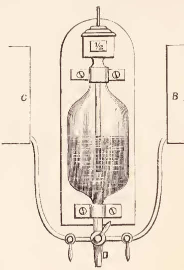

FIG. 1.

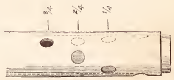

FIG. 2.

genious. Fig. 1 shows the general arrangement; and from Fig. 2 the way in which the device operates will be easily understood. A, Fig. 1, is a glass receiver; B and C are the reservoirs containing the liquid to be measured. These communicate with A by the pipes shown. By turning the valve in either pipe, the liquid from the corresponding reservoir rises in the receiver; and after being measured is drawn off by the tube D. The measuring is controlled by the pipe shown, extending down into the receiver. This consists of a stationary inner tube (dotted lines Fig. 2) and an outer sleeve. The latter communicates with a small cylinder above the receiver, on which cylinder are inscribed the figures ½, ¼, etc. This cylinder is inclosed in a box, so that only one figure can be seen at a time. Both the inner tube and the outer sleeve have a series of openings; but these are arranged as indicated in Fig. 2—namely, so that a coincidence, and consequently the unclosing of an opening into the inner tube, can only occur at one point. Thus in Fig. 2 the upper (¾) opening extends through both tubes owing to the coincidence of the apertures in both; but there is no coincidence at the other holes. The air, then, in the receiver A will escape through this orifice as the liquid enters, but when the liquid reaches and closes the aperture its escape is cut off, and the air remaining in the top of the receiver will prevent the entrance of any more of the fluid from below. The indications on the cylinder above the receiver correspond with the apertures in the outer tube, so that when the figures ½ are shown the apertures corresponding to a height in the cylinder which will be reached by a quantity of liquid which half fills it are brought into coincidence, and—for the reason already stated—only that quantity of fluid can enter. The device is exceedingly accurate, and is very quickly used.

A NEW MODE OF ENLARGING OR REDUCING DESIGNS.

About as simple a contrivance for enlarging or reducing lithographic drawings as I have ever seen is exhibited by M. Fougeadoire. The drawing after completion is transferred to a sheet of soft elastic white rubber, and this, by a series of brass hooks around its edges, is fastened to four rods, as shown in Fig. 3. A is the

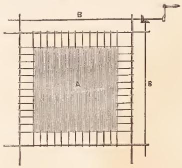

FIG. 3.

piece of rubber. The rods slide upon each other, and are caused to move apart or come together by screws B connected by bevel gearing, and operated by the crank on the left. I merely indicate this arrangement, as any mechanic will perceive how the gearing must be constructed. Of course as the frame is expanded the rubber is stretched equally in all directions, and the design thereon is consequently proportionately enlarged; or the rubber may be stretched first, and allowed afterwards to contract, thus reducing the drawing. The frame of rods may then be lifted free of the gearing, and the design is transferred from the rubber to the stone in the usual way. Simple as this is, it does excellent work; the drawings, even if finely shaded, being reproduced, enlarged, or reduced with notable accuracy.

PARK BENJAMIN.

Intelligence of a Pike.

AMONG other experiments to determine the intelligence of animals, Prof. Mobius performed one with a pike to determine how long it would take to acquire an association of ideas. He ascertained that a period of three months was necessary. This fact was proved by the pike repeatedly dashing its nose against a glass partition in its tank in fruitless efforts to catch minnows which were confined on the other side of the partition. At the end of three months, however, the requisite association was established, and the pike, having learned that its efforts were of no use, ceased to continue them. The sheet of glass was then removed; but the now firmly established association of ideas never seems to have become disestablished, for the pike never afterwards attacked the minnows, though it fed voraciously on all other kinds of fish. From which we see that a pike is very slow in forming his ideas, and no less slow in again unforming them. As regards the association of ideas by the higher vertebrated animals, it is only necessary to say that in all these animals, as in ourselves, this principle of association is the fundamental principle of their psychology; that in the more intelligent animals associations are quickly formed, and when once formed are very persistent; and, in general, that so far as animal ideation goes, the laws to which it is subject are identical with those under which our own ideation is performed.

A POPULAR drink among the Chinese consists of a solution in water of a powder obtained by pulverization of hay, barley, or rye, or of all three together, with or without the addition of aromatic or medicinal herbs, after having undergone a certain amount of fermentation. The powder thus obtained is known under the name of "kin-tsee," and when properly prepared may be preserved two or three years.

Lecture of Professor Fairfield on Ultimate Life Atoms.

(Reported for the Scientific News.)

THE GERM THEORY OF DISEASE DISPROVED BY THE MICROSCOPE.

THE following is a report of a very interesting discourse on ultimate life atoms (commonly called germs or monads), recently delivered by Professor Fairfield, the well-known microscopist, at Cooper Institute. It will be seen that the professor's investigations have led him to take ground against the germ theory of disease, and also to oppose Tyndall and others on the doctrine of spontaneous generation.

There has been, said the professor, a theory of development of animal and vegetable life which has maintained its hold on the world for a considerable time. It is known as the cell theory. A cell is a minute globular body of soft, transparent substance, having within it another body much more minute. The cellular substance is sometimes called protoplasm. Protoplasm is something like the white of an egg ; it is a form of albumen. The white of an egg, when examined in the microscope, is found to be not only fibrous as to its texture, but to have numerous little cells or globules imbedded with the fibres. Its chemical composition is nitrogen, hydrogen, carbon, and oxygen, with water and a little sulphur.

A cell grows in a very simple manner by putting out processes in one direction and another till the cell, including the central globule, is entirely obliterated. The manner of growth is by pushing continually outward from the centre to the circumference. In that way our own bodies were formed. There is no person but was once a simple cell.

While the cell may be regarded as a first element in the production of tissues, there is a something much more minute behind it from which the cell itself may be said to have sprung. The minuteness of this ultimate particle may be conceived when it is considered that a cell varies from the one thousandth to the one five-thousandth of an inch in diameter, while this ultimate atom varies from the one fifty-thousandth to the one one-hundred-thousandth of an inch in diameter. It is the smallest body known to the microscope, and is the first and simplest form of life. If you dry these particles they float about the atmosphere and settle as dust. They settle on your hand as dust. But if you brush them off into water they become active again. They may remain dry any length of time, and may be heated to

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300° Fahr. without destruction of their properties. To all appearance they may be dead, out the moment they are put into water they revive. It does not seem possible to destroy their life. Put them in a fluid containing a little acid and they will remain apparently dead for several weeks ; but if you want to revive them you have nothing to do but add a little potash, and bring back the solution to an alkali solution. The more their properties are examined, the more it seems impossible to destroy them. They can bear a greater degree of heat and cold than people can bear. These particles, under their various forms, are what are known to physiologists as disease-bearing germs. They say that by the circulation of such spores in the atmosphere, and their settling down and taking lodgment in bodies, diseases are produced. Everybody has probably seen a dead fly on a window-pane. There is a white circle around it. If one puts his finger on the white substance, it crumbles like dust, but if a living fly should come across it, the spores adhere to the fly and produce in it a fungous growth such as killed the dead fly. The microscopic vegetation absorbs all the tissues and destroys the fly.

Small-pox is supposed to produce a certain specific germ which, wafted through the atmosphere and lodged in a healthy body, produces the disease. In short, every disease is supposed to produce a specific germ, which is capable of travelling through the atmosphere to any distance. Is it impossible that these so-called germs can exist without disease? Not only is it not impossible, but were one to pass a knife under his finger-nail and dip it in water, he would find that the number of organisms existing even under a nail is practically beyond count. These organisms are so minute that a quarter of an inch is as great a journey to them as people consider a journey of ten miles. The motion of these organisms as a rule is not direct, but round and round in spirals. Monads are to be found everywhere, under the finger-nail, in the saliva, in the tear from the eye, in all the secretions. If a drop of perspiration be examined, there are found dozens and hundreds of these organisms in it. The general conclusion arrived at, from careful and varied examination, is that everybody is full of them. One may keep himself as clean as he pleases ; he may take his bath regularly ; but he cannot prevent his perspiration from being full of them. They are not parasites, properly so called ; they are as small compared with what are ordinarily called parasites as a fly is to a man.

If everybody is constantly throwing out an immense host of these germs, can they be justly regarded as the seeds of disease? If so, every person takes in millions of diseased germs at every breath. The atmosphere is loaded with them. Where do they come from? How are they produced? From what tissues and by what law?

In the ordinary nasal secretion one can count eight, ten, or a dozen of these organisms; but let one take a cold ; instead of this limited number, you then cannot count them. A drop of the secretion will then probably contain 150 or 200 of them. They seem to be due to inflammation and increased heat of the membrane of the nose. Under these two influences, inflammation and increase of heat, they seem not only to spring into being, but to multiply beyond calculation. In diseased secretions they are often not round, but elongated. It is not possible to classify them by structure, for their structure varies with the chemical constitution of the fluid in which they are contained, and with the degree of heat. If they present the appearance of eel-like bodies they indicate the presence of oxalic acid ; if they look like truncated tubes, they denote an alkali ; a still different form tells of the presence of sugar. As a rule, these small bodies are not friendly to acids, but agree well with alkalis and sugar.

In an attack of severe intermittent fever followed by perspiration, if one examine a drop of the perspiration he will find it containing not a few of these organisms, but hundreds. The perspiration in such case is in fact perfectly loaded with them.

Take a drop of blood from the finger. This drop is composed of blood-corpuscles, which vary each from the one five-thousandth to the one eighth of an inch in diameter. In healthy blood they are smooth and globular, but in diseased blood, as when one has intermittent fever, the blood-corpuscles do not present a smooth, clear edge, but appear scalloped or reticulated. They look like as if some hundreds of bodies

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were inclosed in a minute transparent envelope so small that the interior bodies were bursting through, and thus forming projections and prominences on the outside. The number of blood-corpuscles in a single drop of blood in normal good health is from three to four millions, the latter being about the number in exceptionally good health. The number is rather less in females than in males. These corpuscles ultimately resolve themselves into germs, each corpuscle producing about 300.

Perspiration is but an effort of nature to free the system from the immense amount of organic matter which has been set free by the destruction of tissues. The germ theorist must view the existence of monads at all in a living being with alarm. If he sees them in the secretions of a horse he may pronounce the horse to be glandered, whereas the horse may not have the glanders at all. The existence of them in secretions means, in fact, nothing whatever. If they abound too much, the inference may be drawn that there is a too rapid destruction of tissue, and that something is wrong, and that is all. They are discharged by the secretory surfaces at all points, and the discharge means health.

Is the breaking up of the blood-corpuscles into these so-called diseased germs the result of heat or of some other influence? Am I to attribute malarial fever to a poison working in my system, or to heat? It is quite likely that the malarial poison is a chemical poison ; it is not in the least likely that it is a germ poison. After you have once had malarial fever, say in the South-west, and you have become better, you may feel perfectly well, especially with continued doses of quinine, etc. ; but ask any good medical man to examine your blood with the microscope. He will probably find that it has not recovered the perfectly healthy form. The lecturer knew one case of a young man thirty years of age who had had malarial fever, but who had been apparently cured of it five years ago. He was surprised to find, on examination of the blood of this young man, that it was not at all healthy, but disposed to catch the disease again.

The following recipe was given to those present for obtaining cells for their own private examination. Go to one of the city markets, get a couple of bits of beef, cut them into slices, and put them in a bottle of water. Let them stand in the sun for forty-eight hours, and you will have as many of the little organisms as you wish to examine.

Examine a section of the meat. The fibrous portion seems to have become far less. A retrogressive change appears to have set in. There is a great number of those small beings. Do these come from the air? The speaker would say, No. Decomposition in dead bodies is hastened by the presence of living bodies. The experiment should go to show that Tyndall's doctrine of spontaneous generation was inadmissible. But because one might reject Tyndall's theory he was not therefore bound to accept the theory that life springs from certain chemical conditions.

Again, take a lemon ; cut it in two ; squeeze out the juice ; soak it for an hour or two in water that has been boiled so as to exclude the atmosphere. Remove the lemon ; place it in a glass vessel and seal the vessel, so that if any atmospheric germs at all get in they must be very few. Let the whole stand for twenty-four hours, and then make sections of the lemon and examine them. It will be found that every part of the lemon exhibits a mass of fungous growth. This growth lies rather beneath the surface than upon it, and seems to proceed from the core to the surface.

In conclusion, the speaker said : "In matters of experimental science it is almost a waste of time to listen to lectures. You may believe to-night on my veracity, but you can only have positive knowledge when you make the experiments to-morrow for yourselves."

A vote of thanks was unanimously passed to the speaker.

A gentleman asked him if he meant to maintain that no contagious diseases are produced by germs?

The professor said his conclusion was that diseases are not so propagated. He instanced the case of varioloid, in which it was natural to suppose that the vaccine globules were tbe cause of the disease. But in point of fact, vaccine, whose supposed vital globules had been utterly killed by pressure or otherwise, was found capable of producing the usual vaccine results.

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Professor Fairfield was asked if it were possible by the microscope to distinguish human

from animal blood. The question had an important bearing with reference to the recent murder of a police officer in Jersey City, and other similar cases, where it was proposed by microscopic or chemical examination of supposed blood-stains on clothing to determine the nature of the blood and make evidence against the wearer of the clothing.

The professor thought it very doubtful that human could be distinguished from animal blood. An experimenter might be reasonably well satisfied in his own mind, but should he go into a court of justice and make positive oath that certain stains were one kind of blood and not another, he would be assuming a heavy responsibility.

Science at the Academy.

Academicians on the value of disinfectants—Did any one ever die of drinking Croton water?—Yellow-fever and Cholera—Chinese ingenuity—A demand for technical education in our common schools.

(Reported for the Scientific News.)

AT the last meeting of the N. Y. Academy of Useful Arts at Cooper Institute, Dr. Platt read an interesting paper on "Chemical Disinfection." The subject, he said, had not received a proper degree of attention for two reasons : first, for want of suitable opportunities for amateur chemists to make investigations ; and second, for the less noble but more potent reason, want of money. The material universe is made up of sixty-two elements, but of these only four go to form noxious smelling compounds. These four are sulphur, phosphorus, hydrogen, and nitrogen. Oxygen, carbon, and iron are often found combined with these, but seldom contribute to their noxious qualities. The art of disinfection consists in bringing into contact with the noxious elements such other harmless elements as they have a strong affinity for, and thus breaking up the in-

jurious combinations and replacing them by wholesome ones. Sulphur gets the credit of being at the root of most bad smells. A prominent chemist has gone so far as to say that no stink can exist without sulphur. Its combination with hydrogen forms one of the most disgusting and deadly odors known. Yet hydrogen itself is one of the most useful of the elements. So with nitrogen, which enters largely into the material constitution of almost all forms of life. Its presence with sulphur indicates death and decay. Even poor sulphur itself, at whose door nearly all the blame is laid, has its highly important uses, and is a constituent of most animal substances. It is only in combination that these elements are deleterious. In attempting to neutralize the offensive combinations, regard must be had to conditions and circumstances. Thus, if chlorine be used to disengage hydrogen, it must be borne in mind that chlorine and hydrogen will not unite without light, but in sunlight they unite with explosive violence. The dew deposited for beneficent purposes on the rice-fields, if subjected to circumstances and conditions which occasion its decomposition before its absorption by the morning sun, may breed miasma, malaria, and even yellow-fever.

In the discussion which followed, Professor Taylor expressed himself as having little faith in disinfectants. There was a good deal of money thrown away in New York, and he thought not a few thousand dollars were wasted in this direction.

Mr. Haggerty pronounced the whole system of disinfecting an unmitigated humbug. The only real disinfectants were two in number—namely, pure water and pure air. If the Board of Health would flood the streets of New York with salt water regularly and frequently, it would do more to keep the city healthy than all their disinfecting processes. But they do not do this. It is more convenient to get up a nice little job in chloride of lime or carbolic acid, or some such stuff. The Croton water-bug, which some of the newspapers made such a rout about, was another humbug. He (the speaker) never knew a person to die of drinking Croton water yet. The cause of the present epidemic in the South lay in the dirty habits and laziness of the people. The cellars of houses there were filled with every kind of refuse and decaying substances. If every man was obliged to keep his premises clean, to keep his own body clean, his children clean, and every thing about him clean, there would be neither plague nor need of disinfectants. Plenty of soap and water was all they wanted to keep themselves healthy. It struck him that disinfectants did more harm than good by putting people off the right track and directing their attention from the true measures to be adopted. He defied any chemist in the world to prove that disinfectants ever prevented or suppressed disease. If they are any good for doing so, why not show it in the South now? There is a rare field to test their value, if they have any. But they have none. They have been disinfecting long and extensively down there, but we see it is no use; the ravages of the plague are not stayed in the least. Deodorizing companies come forward with their stuffs and nostrums which are not deodorizing at all. Instead of that, they generally create a worse smell than they profess to kill, as every one must have experienced who has been where chloride of lime has been spattered around.

Professor Taylor said that the idea of slinging chloride of lime, or copperas, or carbolic acid around the streets for the purpose of preventing or suppressing yellow-fever or cholera was perfectly absurd.

"Sewage in China" was the next topic. The Chinese system was described, and considerable credit given to the Celestials for it.

Mr. Haggerty thought the Chinese were credited with more than was due them. He never knew of any originality with the Chinese. He recalled the instance of one of our ministers to China, who some years ago wrote to the Commissioner of Patents in Washington a most elaborate and preposterous account of how a number of Chinamen mended a cast-iron pot. Noodles go over there and write about the ingenuity of the Chinamen, not knowing a particle of what they write about.

The chairman said the case of the Chinese was this: No doubt at one time they ranked higher than any other nation in the arts, but several thousand years ago they stopped. They are at present only imitators, but the best imitators in the world. In illustration, he told of how an American in San José, Cal., wanted a row of twenty-four houses built exactly alike. He gave the contract to a Chinaman, who immediately engaged a number of American tradesmen and laborers, who put up the first house. He then discharged these hands and took on Chinamen, who built the remaining twenty-three houses on the model of the first so exactly that every nail and rivet was situated alike. Cheap labor, according to the chairman, was not a political, but a social and industrial question. He ruled that the prosperity of a country depends on the proportion in which every laboring man is paid. The question was often asked, If we cheapen labor by machinery why not cheapen it by Chinamen? There were, however, some very obvious differences. Machinery does not come on a sudden, and it gives more of the comforts of life in compensation for its employment. Machinery is one of the most democratic things in the world.

Mr. Haggerty thought that public education ought to be more directed towards enabling men to earn their living by making them good mechanics, etc. The legislature ought to take hold of this question. He blamed our large machine-shops and factories for teaching their young hands only very limited portions of any one trade. The consequence was, men were turned out calling themselves machinists who were not machinists at all. One man made the leg of a table, another some other part, and so on, but not one engaged in making the table could make a complete table. It was like as if in a school one boy were to be taught reading only, another writing only, and so on.

The chairman thought the best way to mend that state of things was not to prevent but to supplement the knowledge acquired. How that might best be done was a question for consideration.

A gentleman remarked that there was great need of superadding some trade or another to the present training in our public schools. The matter of technical education has been too much overlooked. Some of the branches taught in the Free College, for example, might be profitably taken away and a technical education substituted.

A member observed that the Colt's Arms Company took in apprentices and turned them out skilled workmen earning $3.50 and $4 a day. Mr. Haggerty denied emphatically that either the Colt's Arms Company or the Singer Sewing Machine Company took in any apprentices. With the exception of the class of workmen known as tool-makers, there was not one employé of those companies who could go into any country town with any confidence of being able to act as a machinist, because their practice was too much limited to particular operations.

What Dr. Smith Said to the Polytechnic Institute.

Introductory Address before the Polytechnic Association of the American Institute at the first session after the summer recess, delivered by Dr. J. V. C. Smith, President.

(*Reported for the Scientific News.*)

There is no department in the field of science or art which may not be studied with advantage; and the more we know of the earth on which we exist the better prepared we are for meeting the responsibilities and demands of the age in which our destiny has been cast. It is a trite but an absurd notion, too commonly entertained by persons who have neither a taste nor an ambition for investigations beyond the immediate circle of their everyday experience, that there is nothing new to be learned in the world. All that is worth knowing is already known, and reposing on that satisfactory conclusion individuals who might have contributed to the advancement of society in a variety of directions have lived and died without leaving a record of their existence beyond the memory of their immediate family.

It is not necessary to be perpetually before the public in the capacity of a teacher, or be heralded as a writer of distinction, to be most useful to a generation. If knowledge is acquired, from whatever source, of a useful kind, in the very constitution of our social relations it is diffused and spreads from one to another in conversational intercourse, and thus a community is benefited and advanced, and states and empires are elevated by the acquirements of those who, without being prominent, are the real disseminators of the thoughts, the acquirements, and discoveries of men who interrogate nature and annouce to us those profound and astounding facts which constitute a foundation on which stands the temple of science.

This institution, simple in its structure, no way burdened by useless machinery of a constitution or by-laws requiring frequent alterations to meet real or supposable necessities of a voluntary organization, is precisely adapted to the condition and circumstances of the times. The door is opened to everybody desirous either of hearing or contributing to the gratification of the audience within the ascertained boundaries of useful knowledge. Such is the object and scheme of the Polytechnic Department of the American Institute.

Since our last meeting no very marked achievements have been accomplished in science or art. But perhaps at no period in the history of either have more active efforts been made for brilliant achievements than are this moment occupying the busy brains of men of genius and learning all over the habitable globe.

Astronomical researches have taken the lead, and have had more than usual prominence during the past year. Two eclipses, one of the sun and the last of the moon, inspired astronomers with renewed zeal. There are problems yet to be solved requiring not only great power in the telescope, but an accuracy in mathematical calculations which few are capable of conducting to satisfactory results.

That magnificent nimbus of apparent flame which seems to surround the sun, which spasmodically darts up in streamlets of lurid brightness to the amazing height of 70,000 miles in a second of time, is a puzzle which perplexes the mind of the most learned of that class of observers who are pondering upon the mechanism of the heavens. Is that grand display of celestial pyrotechnics round the huge body of the sun a photosphere—a self-luminous envelope of hydrogen gas, or is it something denser and independent of the vast globe it surrounds, which is the sonrce of light radiating through and beyond the solar system? That is a question on which those star-gazers are at work. They long since ascertained many of the governing laws of the universe, and on those revelations are predicated maritime enterprises which opened to Europe the continent of America. Revolutions of the planets have been determined to an azimuth. Such success stimulates them to further and bolder explorations where, reasoning from analogy, there are millions upon unnumbered millions of worlds as beautiful as our own, infinitely transcending those that sparkle distantly in the firmament, which no eye has yet seen, save that of the Almighty who created and controls them in their orbits. Astronomy, therefore, has no limit, for space has none. So long as that science is cultivated there will still remain an unsatisfied desire to know what there is beyond.

Not so, however, with a more tangible pursuit, that of mechanics, requiring both brains and fingers. Machines are produced that astonish experts in that special domain of genius by their unerring automatic movements in the production of results that seem at first to border upon intelligence. By taking control of the great forces of nature, as it were, and compelling fire and water to obey the behests of man, civilization advances without restraint. There will always be objectors to labor-saving machines, because a few entertain an opinion that for the sake of giving employment to those who imagine they have less to do in consequence of devices that accomplish more in a given time than a dozen, twenty, or a hundred ordinary laborers, such machines should be discountenanced. Even political organizations have occasionally been formed for the purpose of limiting the manufacture of contrivances which do more and better work than can be executed, as formerly by our ancestors before such strange things were devised.

But there can be no retrograde social movement without limiting the development of intelligence. There is no estimate to be made of future inventions still more extraordinary than those which already so much alarm that class of shortsighted humanitarians who would, if they could, compel government to send despatches by horseback messengers instead of patronizing telegraphic companies, who would have reapers in the field with sickles rather than encourage the sale of reaping machines. They would arbitrarily require all kinds of manufacturing industry, the glory of this age, to be done as was the way in the good old times when everybody had honest employment, not taking into account the important fact that since these inventions came into operation sci-

ence and art have made marvellous advances, beyond all former epochs in the history of civilization.

Progress, therefore, in mechanism cannot be arrested without a return of a dark age in which ignorance, fanaticism, and despotism again triumph over the rights of all men in the pursuit of freedom in action and in thought. Of all the higher departments of learning that which explains the phenomena of nature, which elevates the soul and dignifies the race, is essentially dependent on the skill of mechanics. They fabricate the instruments for measuring the circuit of the planets and for seeing what is invisible to the unassisted eye.

There has already dawned upon the domain of science an original genius who, without any of the advantages which men are supposed to require for exercising their mental powers more advantageously, sprang at once into distinguished notoriety. His name is familiar all over Europe, as it is in America, not for having recited in public what others have known or discovered, but in consequence of developing new avenues to knowledge by controlling elements in nature and utilizing them for the benefit of the world in ways and in a manner never before expected to be possible. Societies, institutions, and seminaries of learning are proud to recognize his services and enroll his name in the archives of fame as a star of great magnitude in the catalogue of ancient and modern philosophers. And it has been in this very apartment that a first public exhibition of the triumphs of the telephone was brought before a surprised and delighted audience of appreciating spectators. [Applause.]

Mr. Edison is a marked man, and if his life is spared to the ordinary life period of threescore and ten, being now only thirty-one, there is an immense measure of time for exercising those powers of invention which are hailed with such demonstrations of surprise by philosophers of Europe and America.

A synopsis of what has been achieved for the archives of useful knowledge the past year is embodied in a volume, constituting a permanent record of the advance of mind in unfolding mysteries in nature by a persevering study of those laws on which the stability of a universe depends. Aside from the Edison inventions and discoveries, there were but comparatively few original contributions to the literature of science in the transactions of 1878. The journals and periodicals, however, abound in useful facts and suggestions that indicate activity and untiring devotion to those interests and industries which are as essential to national prosperity as the more hazardous pursuits of extended commercial enterprise.

The most recent and startling proposition is to utilize electricity for a motor power on a scale of grandeur that excites amazement among the most experienced engineers and practical philosophers of this wonderfully inventive age; and to make the falls of Niagara turn the machinery for generating the subtle power and forcing it to any distance where it might be required in manufacturing establishments, in mills, in telegraph offices, and for lighting cities and domiciles. These latter uses give additional interest to the suggestion, and, stranger still, it may all be within the range of possibility, according to opinions of advanced minds learned in the laws of nature.

In the season before us this association will be obliged to depend mainly upon its own resources for keeping alive the deliberations which have heretofore characterized its meetings. It is extremely difficult to procure the services of gentlemen best qualified to instruct us; and the disappointments to which we are frequently subjected in the non-fulfilment of engagements by those who have even solicited permission to appear before you, are discouraging circumstances.

As there is no paucity of material in our own immediate ranks, and ample qualifications for discussing all subjects within the range that is embraced within the sphere of art or science, each one must contribute, as circumstances may require, something towards maintaining the usefulness and reputation and dignity of this association.

STOP THAT NOISE!

After the conclusion of the president's address, a gentleman exhibited a model of an invention for diminishing the noises on elevated railroads. It represented a section of such railroad 60 feet in length, on a reduced scale of one sixteenth. According to it, the running would be done entirely on tubes, and there would be no such thing as splintering or burning. It was claimed that it would be cheaper, safer, and much less noisy than the ordinary elevated roads. The bed of each track was represented by four horizontal metal tubes one above another, and firmly braced together at intervals. The main idea, the inventor said, was to utilize the strength of metal in such constructions, so that none might be lost. He also exhibited an improved plan of truck, and also an apparatus that would put the present elevated roads on the same principle without the necessity of tearing down and rebuilding.

Frauds in Manufacturing.—The Weighting of Textile Fabrics.

THE *Chemical Review* publishes a timely and caustic article upon the above subject, from which we make the following extracts, and commend them to the attention of such political economists as believe the only way to establish manufacturing supremacy is to flood the market with goods that can be sold at a low price without regard to quality.

Among the many improvements effected in this age of progress not the smallest is the art of sinning by the hands of others, whilst we reap the benefit of the questionable transaction, and, in our own opinion, escape all responsibility. This stratagem is practised with success in various spheres of life. We not unfrequently see some wealthy and influential philanthropist, great at "conferences," and dealing largely in benevolence, wholesale and for exportation, who yet commits, through the instrumentality of some unfortunate manager or private secretary, the meanest and most unjust actions, shaving, so to speak, along the very edge of the law. But the world does not, in the words of the old adage, put the saddle on the right horse. If such scandalous affairs are spoken of at all, it says apologetically that the great and good man is unable to look with his own eyes into every department of his extensive and varied concerns, public and private, and has been unfaithfully served by his subordinates. Sometimes it actually happens that the law has been openly infringed. But then it always turns out that some agent is—technically, at least—the responsible party, and our philanthropist quietly sails on with unspotted plumage. To come more directly to the point, the public is now scandalously robbed by dyers, though not for their own benefit or pleasure. The manufacturer uses them as a tool to pick the pockets of his customers. Every one knows that silk, in the process of ungumming, loses a very considerable portion of its weight, which may even exceed 25 per cent. The manufacturer, annoyed at thus losing a portion of a valuable article, began to stipulate that the dyer should, in spite of this natural and inevitable loss, return him the same weight of dyed silk as he had received in the raw state. To do this the dyer was compelled to plaster, so to speak, upon the fibre matters not really requisite for dyeing, but which should make the fibre heavier. Appetite grows by what it feeds upon, and when a depraved and perverted ingenuity had succeeded in bringing up the weight of the silk to what it had been before ungumming, the process did not stop. The manufacturer who sent 100 lbs. of silk to the dyer came gradually, in some extreme cases, to receive back 150 lbs. of an article which was not, indeed, silk, but which could be called silk, and sold as such. For the outside public the great disadvantage remained that the weighting materials have none of the physical and chemical properties of genuine silk, for which it is valued. Weighted silk is weak, inelastic, brittle, yielding rapidly to friction. It readily absorbs damp, and instead of resisting the action of the atmosphere, when heaped together in large quantities it is capable of heating, like ill-made hay, and of actual spontaneous combustion. Genuine natural silk will scarcely burn if laid upon a fire; weighted silks, in the yarn at least, will burn spontaneously. When ladies complain that their silk dresses wear out with surprising and unaccountable rapidity, scarcely outlasting those of humble cotton, and being utterly incapable of undergoing those mysterious processes of "turning" which our mothers and grandmothers used to practise; when our best umbrella, warranted of "pure Italian silk," begins to split down each segment after six months' very careful usage, we see in all this the consequences of weighting.

There is an old West Riding joke of mixed goods in which the wool was all cotton, and the cotton all jute. But cotton and jute, if inferior in value to wool, are at any rate textile fibres. But we are now in danger of wearing, or, at any rate, of buying tissues where the cotton is all Cornish clay, and the wool all chloride of magnesium. The latter salt is now imported in abundance from Germany, where it is obtained as one of the products of the great salt beds of Stassfurt, and is sold under the name of "crystal size." It is a remarkable fact that sophisticating manufacturers, merchants, and tradesmen, just like burglars and pickpockets, have always some slang name for the articles they employ in their underhand operations. They shrink from calling a spade a spade, fearing, perhaps, lest the public should call a knave a knave. Thus bakers speak of the potatoes which they legally, though not equitably, mix with their ware as "fruit." Then we have such other expressions as "stuff," "hards," "multum," "the doctor," and many more. Whether we are to regard the use of such language as part of the tribute which vice is said to pay to virtue we leave an open question. But whether we are to call chloride of magnesium by its own name, or by that of "crystal size," its properties are the same, and these we must now consider. It is so soluble in water that its solution weighs upwards of 20 lbs. to the gallon. It has little or no action upon coloring matters; applied to dyed goods it does not betray itself by spots and stains. These properties are just what the sophisticating manufacturer wants. But it is deliquescent, and constantly draws more moisture out of the atmosphere. Hence no textile fabric which has once been treated with this liquid can ever be made thoroughly dry till every trace of the weighting has been washed out. Now, as blankets, flannel, etc., are often put to use without a previous washing, it follows that many persons unwittingly encounter the perils of damp beds, underclothing, and the like. How many cases of rheumatism, cough, consumption, and other diseases, if not directly caused by this modern commercial iniquity, are aggravated by it, would not be easy to ascertain. There is something particularly villanous in a practice which thus converts the very precautions we take to preserve our health into causes of disease and death. But people should wash their blankets, flannels, etc., before taking them into use. But how are they to do it, so as to remove this iniquity? The only effectual way—prolonged steeping in a succession of waters—is what no housewife will care to adopt, because it makes the goods shrink. And if such flannels are washed with hot soap lye in the customary manner, the chloride of magnesium will decompose the soap, forming a "magnesian soap," and coating every fibre with a smeary layer, scarcely ever to be removed without using soda to a most injurious extent. The law punishes—leniently, indeed—the baker, grocer, or publican who sells to the public a debased article. Will no statesman propose imprisonment as a cure for chloride of magnesia? We have been told that the old and fast-vanishing fame of the English woollen trade was in no small degree due to the fact that one of our earlier kings did, in all solemn sadness, hang such as made "evil cloth."

IDLENESS AND WASTE.—There are thousands who do nothing but lounge and carouse from morning till midnight—drones in the human hive, who consume and waste the honey that honest workers wear themselves out in making, and insult the day by their dissipation and debauch. There are ten thousand idle, frivolous creatures who do nothing but consume and waste and wear what honest hands accumulate, and entice others to live as useless and worthless lives as they do. Were every man and woman honest toilers, all would have an abundance of every thing, and half of every day for recreation and culture.

A Valued Testimonial.

S. H. WALES & SON.

GENTLEMEN: Since June last you have made seven applications for patents for improvements used in our trade, all of which have been granted upon satisfactory claims. The business has been done without trouble to me, and at very moderate cost. I have never before been so well served in the patent business.

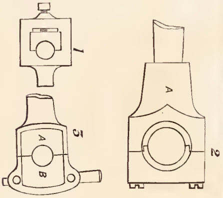
Yours very respectfully,
A. V. BROKHAHNE.

NEW YORK, September 15th, 1878.

Solid End Connecting Rods.

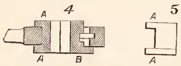
BY JOSHUA ROSE, M.E.

IN Fig. 1 is shown the simplest form of solid-ended connecting-rod. It has but one brass, and the adjustment is made by the set-screw shown, to which there is sometimes added a check-nut to prevent the screw from slacking back. During the pulling stroke of the rod the whole of the strain is concentrated on the end area of the set-screw, and this causes it to imbed in the brass, giving play to the brass unless frequent adjustment is made. It is difficult to readily obtain a very accurate adjustment with a simple set-screw of this kind, and furthermore the rod gets, as it were, shorter from centre to centre of the bore of the brasses.

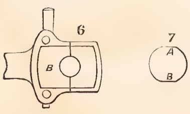


In Fig. 2 is shown a form of end not unfrequently used upon very small rods. The rod-end screws into the brass A, so that when it wears shorter to the amount of half the pitch of the thread upon the rod-end, the brass may be unscrewed half a turn, and the original length will be restored. The cap is held on by two screws, which may have slotted heads as shown, or screws with check-nuts to prevent the screws from slackening back, as all screws are apt to do that receive sudden strains in reverse directions.

In Fig. 3 is shown a very substantial form of solid-ended rod, a plan view being shown in Fig. 4. The back brass A has a flange, as shown, in Figs. 4 and 5 at A, which secures it to the rod end at the back. The front brass B, Figs. 3, 4, and 6, has the key-way partly

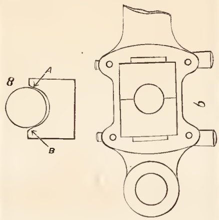


sunk in it, and the key binds against one side as well as on the bottom of the key-way, and this draws that brass close down to the face of the rod, as shown in Fig. 4. In order to cause the rod to maintain its original length, the key at one end is placed outside the crank-pin, while at the other end it is placed inside or between the crank-pin and the stem of the rod, as shown in Figs. 3 and 6. In this, as in many solid-ended rods, the flange or collar of the crank-pin requires to pass through the brass opening of the rod. This may be accomplished by making the brass opening large, or wide enough to pass over the crank-pin collar (which

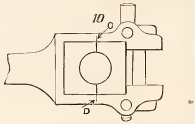


will increase the width of the brasses, and hence that of the rod-end); or else the crank-pin collar may have two flat places filed on it, as in the end view shown in Fig. 7. The objection to this plan is that the rod can only be taken on and off in one position of the engine—that is, when the two flat places A and B, Fig. 7, stand parallel with the length of the rod.

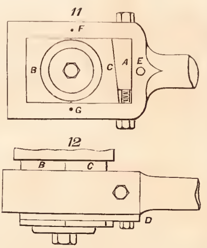
It will be noticed in Fig. 4 that the brass B does not fill the space in the rod. This is because that brass has to pass in over crank-pin collar and push up into the journal after it is in the rod. To make this space as small as possible, and to enable giving the crank-pin as large a collar as possible, the key brass (B) is sometimes bevelled off, as shown in Fig. 8



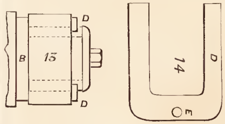
at A B. Another form of this rod end is shown in Fig. 9, in which there are two keys to the brasses, the object being to adjust the keys to maintain the rod of its proper length. In order to facilitate making this adjustment, there should always be upon the face of the rod-end centre punch marks, as shown in Fig. 11 at F G, or else two deep marks, as shown at C D in Fig. 10. Then, in lining up the



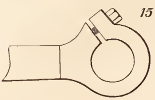
brasses to set the key back, the rod may be restored to its original length by putting behind the back brass a piece of metal of such thickness as will bring the centre of the bore of the back brass B even with the centerpunch or other marks. This being the case, it does not matter about the exact thickness of the piece of metal put behind the other brass, since a variation in that will only act to let the key come more or less through the rod-end without affecting the length of the rod. (This remark does not, however, apply to rods in which there is a strap which moves as the key is set up.) In Fig. 10 is shown a form of rod end sometimes used. The end being open, the brasses pass through it. In this case the whole strain of the pull of the rod falls upon the edge of the gib at top and bottom of the strap, causing the gib to wear out very fast; furthermore, the back brass condenses the metal at the back of the brass opening, acting to pene it and throw the points of the rod-end open, which it always does, the jaws of the gib imbedding in the jaws of the rod. This opening of the rod jaws makes the brasses loose in their places; hence this is a weak and undesirable form of rod-end, though very convenient to take on and off. In Figs. 11, 12, 13, and 14 are shown a form of solid-ended rod of more modern construction. In this case a wedge A is used instead of a



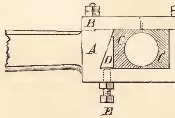
key, being adjusted by screws passing through the rod at the top and bottom, it being obvious that the set-screws may have check-nuts added. B is the back brass, and C the key brass. In this case the flange of the brass goes next to the crank-pin, and a plate D is provided to serve as a flange on the front face of the brass. In Fig. 11 this plate is removed to show the wedge A; but it is shown in the Plan View 12 and the End View 13, and by itself in Fig. 14. A groove is cut on each side of the two brasses and the plate spans, the brasses passing up the groove, being held in position by a screw at E. The opening for the brass (in the rod-end) is here shown wide enough for the rod-end to pass over the collar of the crank-pin, but



in many cases, with this as well as with other forms of solid-ended rods, the crank-pin may be made plain, that is without a flange, and have a washer secured by a screw (as shown in Figs. 11, 12, and 13), so that by removing the washer the rod may be put on with the brasses already in place, and made no thicker (at the joint face) than is necessary for strength. In Fig. 15 is shown what may he termed a clip-



end connecting-rod, the screw closing the rod-end (to take up the wear) against the spring of the metal. It is obvious that in this case the hole may receive a brass bush split as is the rod-end and secured from turning by a pin. Fig. 16 presents another form of solid end-rod, which admits of the use of a brass having a



flange on both sides of the strap, and will take on and off by removing the cap B. If the crank-pin collar is solid, the brasses must be placed on the crank-pin, and the rod, with the wedge in place, lifted or lowered to the brasses; but if the crank-pin has a washer and screw, the rod may be put together and slipped on its place.

Harvest Binder.

AN English paper mentions the fact that American mechanics have invented many most valuable agricultural implements and machines, which have been introduced to and adopted by their own farmers. Amongst these none are more useful than the "self-binding harvester," invented and perfected by Mr. Walter A. Wood. This machine cuts and binds wheat, oats, etc., at the rate of fifteen acres per day, and does its work in the most thorough and effective manner. Some years ago Mr. Wood introduced a reaping and binding machine, which was then much admired, but which, being made and designed for America, was not altogether suitable for harvesting and binding our longer and heavier English crops. The one now under notice, however, he has so altered and improved that it will bind a five-foot sheaf, and it has a cut of five feet at the knife also. In addition to this, should it be necessary to reap a crop in excess of five feet in length, there is an arrangement by which the platform and cutter can be raised from the ground—and this also is under the control of the driver.

Testing the Value of Lubricants.—No. 3.

BY W. H. BAILEY.

INFLUENCE OF THE ATMOSPHERE ON OILS. —There are some oils which are excellent lubricants for the first few hours of use, but which have a low capacity for resisting the influence of the oxygen of the atmosphere upon them. The warm glass test may be used for indicating this weakness if after the test for fluidity the oil be permitted to remain on the glass any exhibition of a resinous or varnish quality may be observed. Another test for this resinous or gummy quality is one which has been suggested to me by Mr. F. R. Wheeldon, of Bilston. He has made many experiments. He found that by permitting oil to remain on a Stapfer friction tester after one test which had been recorded, he tested again on the following day, without adding any fresh oil. This is a severe test, as the thermometer was made to indicate 200° Fahr. each time.

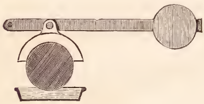


FIG. 6.

LONGEVITY OF LUBRICANTS. — Supposing an oil to possess all the qualities which we think a good lubricant should have—that it has fluidity in season, and that it does not combine with the atmosphere and become varnish, that it does not become like water in summer and like mutton suet in winter, and is in most respects satisfactory. We then want to know its powers of endurance, its capacity to resist wear and tear—in other words, its longevity. A good test for longevity or durability of oil when subject to either heavy or light frictional pressure is one suggested by Mr. W. H. Hatcher, a very careful investigator, and Chief of the Laboratory of Price's Patent Candle Company, who are extensive oil manufacturers. It consists in taking away the bottom step of the Stapfer tester and placing a small dish containing oil underneath the friction roller (Fig. 6). This oil is carefully weighed before and after several hours' frictional wear and tear. The drawing (Fig. 7) shows the application of this mode, which I have designed, for testing solid lubricants, such as lard and sulphur and other railway and steamship mixtures. It will be seen that the material is kept to its duty by the weighted lever, and its progress of diminution can be tested in its place by the scale-beam arrangement. When it is used with the pressure on the top step it is advisable to drive it at about 2000 revolutions per minute ; otherwise much time will be occupied in destroying a weighable quantity of oil. The large Stapfer tester (Fig. 8) was designed a few months ago for this purpose for the Government railways of New South Wales, and it is also used by the Manchester, Sheffield, and Lincolnshire, Lancashire and Yorkshire, and other railways. I have not been able to get any results of these tests in time for our subject this evening, but hope to do so at some future time. The frictional roller is 6 inches in diameter, the pressure amounts to 1 cwt. on each step. As it takes a considerable time to wear away half a pound of solid lubricant, it may be advisable to measure by minutes instead of using the speed index. The speed should be at least 1500 revolutions per minute. The Stapfer tester should be used in a room of equal temperature and should not be subject to draughts of cold air, as it will be obvious these will interfere with the indications of the thermometer. A recent alteration in the Stapfer tester permits the quantity of oil used for testing to be measured with greater accuracy than before. A small oil-hole is made in the top step (see Fig. 8a) in which is placed a glass tube. This only holds a few drops, and can be filled by simply dropping the oil in, holding the finger at the bottom to prevent it running away, and then place it in the hole. If a small needle lubricator be weighed and then filled with oil of a definite weight, and placed in this hole (see Fig. 8b), oil may be tested for longevity and for its anti-frictional properties for a longer period than with the small tube. If oil be placed in this at the same time that oil is placed in the lubricators in the works and the oil tester be driven from the same shafting, permitting it to stop and start when the engine stops and starts, the effect of a week's work upon the weight of the oil may be seen ; notice should be taken of the difference of the temperature between the thermometer on the instrument and the temperature of the atmosphere of the workshop.

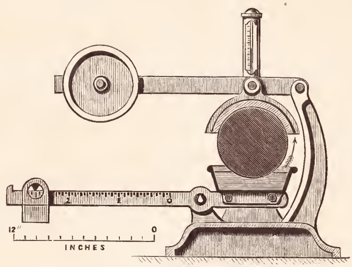
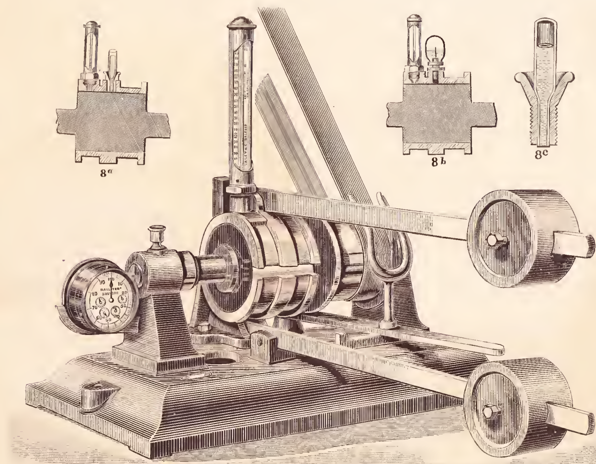
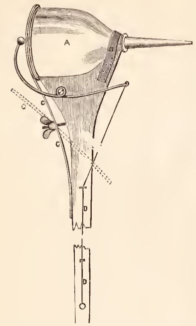


FIG. 7.



How to Oil Shafting.

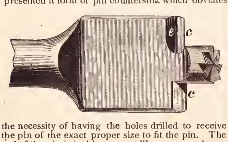
JOHN HARDISTY, of Peace Dale, R. I., sends us the accompanying sketch of a convenient device for oiling shafting without the use of a step-ladder, which he has used in the mill where he is employed. A is the oil-can held to a rod or piece of wood by the strap B and the spring



C. D is a cord attached to the end of a lever pivoted to the piece of wood, so that pulling D causes the end of the pivoted lever to squeeze the bottom of the oil-can and eject the oil. To get the oil-can out the spring swings to one side, assuming the position denoted by the dotted lines.

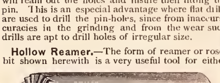
Shop and House Hints.

Facing Tool or Countersink.—Herewith is presented a form of pin countersink which obviates



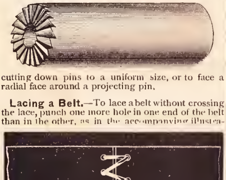
the necessity of having the holes drilled to receive the pin of the exact proper size to fit the pin. The end of the pin is in this case cut like a reamer, hence will ream out the holes and insure their fitting the pin. This is an especial advantage where flat drills are used to drill the pin-holes, since from inaccuracuracies in the grinding and from the wear such drills are apt to drill holes of irregular size.

Hollow Reamer.—The form of reamer or rose-bit shown herewith is a very useful tool for either



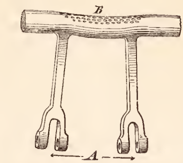
cutting down pins to a uniform size, or to face a radial face around a projecting pin.

Lacing a Belt.—To lace a belt without crossing the lace, punch one more hole in one end of the belt than in the other, as in the accompanying illustration,



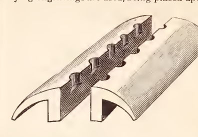
tion, the extra hole coming in the middle of the end of the belt. Draw the lace half way through this extra hole, and lace each way to the side and back again to the middle, and tie the two ends on the outside.

Setting Work with the Hammer.—The hammer is often used to straighten work that has warped in the casting. Thus suppose the accompanying illustration represents a lever, the arms of which are

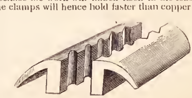


out of the right angle with the main stem. A light hammer may be used to stretch the metal at B, which will close the arms at A and straighten them; but if the effects of the hammering are removed, as by turning out the hammer marks at B, the arms would go back to their original position, as the skin only for about $\frac{1}{32}$ inch deep is stretched by the hammer.

Vise Clamps.—For holding small round work or pieces of wire the clamps shown in the accompanying engravings are used, being placed upon the



jaws of the vise. They are best made of copper, so that any filings that may lodge in the grooves will imbed in the copper rather than bruise or indent the work. For flat work similar clamps made of sheet-copper may be used, but a pair made of lead are always essential—first, because the lead, being soft, will not damage the work; and secondly, because the work will imbed itself in the lead, and the clamps will hence hold faster than copper ones.



When copper ones are used they should be heated to redness and quenched in water occasionally to soften them. When lead is used, the vertical part which grips the work should be made at least ⅝ inch thick when new. The top and side faces of lead clamps are apt to become bulged from holding short work, and to remedy this the clamps should be put upon their places in the vise and the vise-jaws screwed tightly together, when the bulging edges of the clamps may be hammered well down.

Magnets.—W. T., of Ohio, inquires about magnets. It has been ascertained that a magnet weighing 2 ozs. sustains a weight of 3 lbs., or about 25 times its own weight, whereas a magnet of 100 lbs. sustains only 271 lbs., or rather less than 3 times its own weight.

Two magnets of the same size and power, acting separately, support twice the weight that one of them does; but if the two are joined so as to form one magnet, they do not sustain the double, for the two magnets being in close proximity act inductively upon each other, and so lessen the conjoint power.

Glue-Making.—Glue is made from parings and waste pieces of skin, the refuse of tanneries, the tendons and other offal of slaughter-houses. They should be steeped in slaked lime mixed with water, and then drained and dried. When about to be converted into glue they should be steeped in weak milk of lime, and then dried, and then boiled in a copper with a false bottom to a thickness. The gelatine is run into the congealing boxes, and finally on to a flat board, whence it is cut into cakes, and is hung on nettings to dry. The heat applied in the last process is done by steam or hot water.

Good Petroleum should have the following characteristics: 1. The color should be white or light yellow, with blue reflection. 2. The odor should be faint, and not disagreeable. The specific gravity at 60° Fahr. ought not to be below 0.795, nor above 0.84. 3. When mixed with an equal volume of sulphuric acid, of the density of 1.53, the color ought not to become darker, but, on the contrary, lighter.

To Preserve Wood.—Mix at the rate of 5 lbs. of chloride of zinc to 25 gals. of water, most effectual to steep wood in to prevent dry-rot.

Portable Glue.—Best glue ½ lb., water sufficient, boil it in a double glue-pot, and strain; add ¼ lb. brown sugar, and boil pretty thick, then pour into moulds; when cold cut into small pieces, and dry them.

To Remove Glass from Old Sashes.—American potash 3 parts, and 1 part unslaked lime; lay it on both sides, and let it remain 24 hours. It will also take off tar and paint.

To Polish Furniture.—Melt together ½ lb. of beeswax and ¼ oz. of alkanet root, until the former be well colored, then add linseed-oil and turpentine, of each ½ a gill, and strain through coarse muslin.

Seal Engraver's Cement.—Melt common resin and brickdust together; it improves every time it is melted.

Armenian Cement.—To mend glass, jewellery, etc., dissolve isinglass in brandy or spirits of wine, and adding to it an equal bulk of thick mastic spirit varnish; when made it should be as thick as common glue.

Golden Gloss.—Professor Bottger states that a fine golden gloss may be imparted to leather by brushing it over with a broad soft brush dipped in a concentrated solution of roseine in an alcoholic solution of shellac.

To Dye Horn in Imitation of Tortoise-shell.—Mix pearl ash, quick lime, litharge, and a little dragon's blood. Boil together for half an hour, and apply hot to the parts of the horn desired to be colored.

Sealing-wax.—Red is made by carefully fusing together 48 parts of shellac, 19 of Venice turpentine, 1 of Peru balsam, and 32 of fine cinnabar. Black is colored with lamp-black; yellow with a chromate of lead; blue with smalt; green with carbonate of copper.

To Take Casts from Medals.—Melt 8 ozs. of sulphur over a gentle fire, and mix with it a small quantity of fine vermilion. Stir it well together, cast it into the mould (which should be made of pipe-clay or putty). When cool the figure may be touched over with a little sulphuric acid, and it will assume the appearance of coral.

A Varnish made of Canadian balsam, dissolved in turpentine, supplies a most valuable means of making paper transparent. The mode by which this is most satisfactorily accomplished is by applying a pretty thin coating of this varnish to the paper, so as to permeate it thoroughly, after which it is to be coated on both sides with a much thicker sample. The paper is kept warm by performing the operation before a hot fire, and a third or even a fourth coating may be applied, until the texture of the paper is seen to merge into a homogeneous translucency. Paper prepared according to this process is said to come nearer than any other to the highest standard of perfection in transparent paper. Care must be used in making, as the materials are highly inflammable.

Treatment of Bunions.—The treatment consists in removing all pressure from the part. The formation of a bunion may in the beginning be prevented; but, when actually formed, it is scarcely possible ever to get rid of it, and it remains an everlasting plague. To prevent the formation of a bunion, it is necessary, whenever and wherever a shoe or boot pinches, to have it eased at once, and so long as that part of the foot pinched remains tender, not to put on the offending shoe again. When a bunion has once completely formed, if the person wish to have any peace, and not have it increase, he must have a last made to fit his foot, and have his shoe made upon it. And whenever the bunion becomes inflamed and is painful, it must be bathed with warm water and poulticed at night.

To render Corks Air and Water Tight.—The *Chem. Zeitung* suggests the use of paraffin as the best method of making porous corks gas and water tight. Allow the corks to remain for about five minutes beneath the surface of melted paraffin in a suitable vessel, the corks being held down either by a perforated lid, wire-screen, or similar device. Corks thus prepared can be easily cut and bored, have a perfectly smooth exterior, may be introduced and removed from the neck of a flask with ease, and make a perfect seal. The method has long been in use in English laboratories.

Death to Rats.—A German baron recommends as a cheap and simple method of exterminating rats a mixture of two parts of well-bruised common squills and three parts of finely-chopped bacon made into a stiff mass, with as much meal as may be required, and then baked into small cakes; these are put down for the rats to eat, and are said to effect their complete extirpation.

Coating for Woodwork.—Good lime slaked with sour milk and diluted with water till it is of about the consistency of ordinary whitewash, is recommended by the *Landwirth* as an excellent coating for woodwork. Fences, rafters, partitions, etc., are, it says, effectually protected against the weather for at least ten years by this application. The casein of the milk in combination with the lime forms a permanent film, which dries so quickly in warm weather that heavy rains falling directly after it has been laid on will scarcely affect the work.

India Ink of a deep black, which gives neutral tints for half shades, is very rare. It may be made as follows: Rub thoroughly together eight parts lamp-black, sixty-four parts water, and four parts of finely pulverized indigo. Boil until most of the water is evaporated, then add five parts gum-arabic, two parts glue, and one part extract of chicory. Boil the mass again till it is thickened to a paste; then shape it in wooden moulds which are rubbed with olive or almond oil.

PATENTS.

S. H. WALES & SON, Editors and Publishers of the SCIENTIFIC NEWS, have had nearly twenty-five years' experience in taking out patents for new inventions, and offer their services to those who wish to secure patents in the United States, Canada, Great Britain, France, Germany, Belgium, Austria, Russia, Italy, and other countries. Caveats filed, Designs patented, Trade-marks and Labels registered, Rejected Cases prosecuted, Reissues obtained, Interferences managed, Assignments and Licenses prepared.

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Inventors have a right to know the character and standing of those to whom they confide their interests.

The senior Mr. Wales is well known in New York, and was for a period of nearly twenty-five years connected with the business of securing patents for new inventions. He was also selected by the then Governors of New York and Connecticut to represent those States at the "World's Fairs" of 1855 and '67, and attended both. If necessary, Mr. Wales could refer to many of the most prominent citizens of the country. Read the following newspaper testimonials:

The Scientific American, referring to the resignation of Commissioner Duell, says: "We learn that our old friend and former associate on the *Scientific American*, Salem H. Wales, Esq., is strongly advocated for the Commissionership. For more than one year Mr. Wales occupied the position of President of the Department of Parks, and subsequently and now for over three years has been the official head of the Department of Docks of this city. In discharging the difficult duties of both these highly responsible positions, he has exhibited rare executive ability. In both he has been called upon to direct engineering work of magnitude, to govern the expenditure of large sums, to interpret laws, many intricate and perplexing, yet involving interests, both public and private, of the highest importance. Through his extended experience in these varied and onerous requirements, he has acquired a breadth and class of knowledge which render him exceptionally well fitted for filling the Commissionership in a manner acceptable to inventors and to the country at large."

The Evening Mail of January 11th, 1877, says: "There has been some talk here and in Washington of the appointment of our highly esteemed fellow-citizen, Hon. Salem H. Wales, as Commissioner of Patents. As Mr. Wales is in such a position of independence that the compensation of that office could not be any inducement for him to accept its onerous responsibilities, we are certain that he does not seek or desire such a place. But whoever first suggested his appointment fitly recognized his eminent qualifications for the Commissionership in question. During the best part of his active career—while associated in the conduct of the *Scientific American*—it was his business to become practically familiar with all the intricacies and technicalities of the Patent Office. His experience would make him entirely at home in all the duties of that office, and he would bring to their discharge the ability, business habits and special skill which made him and the *Scientific American* so successful. The public interests, and those of deserving inventors, would be largely promoted by his acceptance of the Commissionership. But we do not believe he would accept."

The New York Evening Post, under the caption "A Good Candidate," Dec. 29th, 1876, says: "Mr. Salem H. Wales, President of the Department of Docks in this city, is mentioned as a possible successor to Mr. Duell as Commissioner of Patents. As editor of the *Scientific American* he has had more than twenty-three years' experience in connection with patent interests, and his high personal character would be an additional recommendation. It is not known that he would accept the office, but he would make a good officer."

Of the same date the *Commercial Advertiser* says: "Mr. Salem H. Wales, of this city, is spoken of in connection with the office of Commissioner of Patents, to fill the place made vacant by Mr. Duell, who has resigned. Mr. Wales' long association in the editorial management of the *Scientific American* eminently fits him for the place. The city never had a more faithful and upright officer than Mr. Wales."

The New York *Sun* of Oct. 22d, 1875, published in its editorial columns the following: "When Mr. Wales was one of the editors of the *Scientific American*, and was devoting his energies and his mechanical knowledge to the development of the inventive genius of our people, he organized an admirable system for the obtaining of patents, classifying the various inventions according to the essential principles upon which they were based, and the uses to which it was sought to adapt them."

The Junior Mr. Wales has until recently held a position in the Examining Department of the United States Patent Office.

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